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ON THE ALKALI OF THE PLAINS IN BRIDGER VALLEY, WYOMING TERRITORY.

BY E. GOLDSMITH.

Whilst visiting Fort Bridger, Wyoming, Prof. Leidy observed on the plains in the vicinity an efflorescent salt, called there alkali. It appears as a dirty-gray powder; amorphous not only to the naked eye, but also beneath the microscope.

The flame reaction shows the presence of soda and potassa. Heated in the closed tube it blackens and emits some water having an alkaline reaction. Water dissolves part of it, and leaves a dark-colored residue. In the watery solution I recognized lime, potassa, soda, sulphuric acid, and a trace of chlorine and ammonia. The insoluble part consists of silica, colored by oxide of iron.

After two grammes were perfectly exhausted with distilled water, the water expelled and the remaining mixture of salts dried on steam, I obtained 0.551 gramme = 27.55 per cent.; the insoluble part is the difference, or = 72.45 per cent.

Upon separating the lime, and changing the sulphates of potassa and soda into their respective chlorides, I obtained a dry mixture of 0.448 gramme of chlorides, from which was extracted 0.08389 gramme of chloride of potassium; hence, by subtracting 0.36411 gramme of chloride of sodium and computing these chlorides into sulphates, we get approximately:—

	Sulphate of soda	= .442 gram.	= 22.10 per cent.
	" potassa	= .098 "	= 4.90 " "
By difference,	" lime	= .011 "	= .055 " "
The soluble part,		= 0.551 "	= 27.55 " "
Adding the insoluble part,		= 1.449 "	= 72.45 " "
Sum,		2.000 grams.	= 100.00 " "

Alkaline Incrustations.—At the Mineral Springs, Pioneer Valley, W. T., Prof. Leidy found a material which, if carefully picked out from some loose powder mingled with particles of vegetable matter, appears as a white soft substance, which easily crumbles between the fingers. Its aspect is like that of an incrustation of recent date, derived from a watery solution, of which the solvent quickly evaporated. It is irregular in shape; some pieces are formed on one side, similar to cauliflower; no crystalline particles are seen by ordinary inspection. Beneath the microscope, however, a few prismatic crystals were observed.

The flame reaction indicated soda and potassa.

Heated in the tube, closed at one end, it changes to black, showing that the substance contains some organic matter; it also gives water.

If heated on coal before the blowpipe, it is all absorbed.

In water, the substance is soluble, with the exception of a small quantity of flocculent matter, which seems to be silica.

The watery solution is alkaline to test-paper. The solution seems to contain no other bases than those named above, but partly combined with chlorine, partly as sulphates and carbonates. No attempt was made to determine the organic matter.

I found that 0.727 gramme lost on steamhead 0.006 gramme = 0.82 per cent. of water. 1.4035 gramme gave 1.2605 gramme sulphate baryta = 0.4327 gramme = 30.83 per cent. of sulphuric acid. 0.7445 gramme gave 0.5875 gramme of chloride of silver = 0.1452 gramme = 19.50 per cent. of chlorine. 1.000 gramme of the substance gave, after the sulphates had been converted into chlorides, 0.8865 gramme of a mixture of chloride of sodium and chloride of potassium, from which I separated 0.1948 gramme of chloride of potassium; hence 0.8865 — 0.1946 = 0.6919 gramme of chloride of sodium.

From the data, the computation in regard to the affinities was carried out with the following results:—

Na Cl	. . .	32.14	per cent.	
$\dot{Na}\ \dddot{S}$	. . .	36.21	" "	
$\dot{Na}\ \ddot{C}$	. . .	6.52	" "	
$\dot{K}\ \dddot{S}$	. . .	22.71	" "	
$\dddot{Si}$	. . .	0.21	" "	
$\dot{H}$	. . .	0.82	" "	
Organic matter,	. . .	1.39	" "	by difference.
		100.00		

In the result of this analysis, it is demonstrated that four distinct alkaline salts are contained in the mixture in which the potassa sulphate is remarkable. From the small quantity of water found, I infer that the atmosphere must be extremely dry in that particular locality.

Two other mineral specimens from the same locality were obtained by Prof. Leidy. Both were of the same general character. They are uneven, rough, and formless. Throughout the mass small irregular holes are seen, which probably were produced by carbonic acid gas. Both specimens were analyzed and found to be of the same composition. They are impure carbonate of lime, containing some soda and potassa, and are colored by oxide of iron.